REMARKS

Claims 1-13 were rejected under 35 U.S.C. Sec. 112, second paragraph, for being indefinite. Specifically, objection was made to the means plus function language as not satisfying 35 U.S.C. Sec. 112, paragraph 6. Accordingly, the means plus function language has been eliminated from these claims to make clear that Sec. 112, paragraph 6 is not being invoked. The claim elements are now defined as specified in the detailed description. It is therefore respectfully submitted that Claims 1-13 are now clear and definite.

Claims 1-13 were rejected under 35 U.S.C. Sec. 103(a) as being unpatentable over US Pat. 6,574,492 (Ben-Hiam et al.) in view of US Pat. 6,233,477 (Chia et al.) in view of U.S. Pat. 5,357,550 (Asahina et al.) Amended Claim 1 describes a medical system comprising a medical instrument to be guided in a patient body, an X-Ray acquisition system which acquires a two-dimensional X-ray image of said medical instrument, an ultrasound acquisition system for acquiring a three-dimensional ultrasound data set of said medical instrument using an ultrasound probe, a localizer which provides a localization of said ultrasound probe within a referential of said X-ray acquisition system, a selector operable to select a region of interest around said medical instrument in the three-dimensional ultrasound data set, that defines a first localization of said region of interest within a referential of said ultrasound acquisition system, a converter which converts said first localization of said region of interest within said referential of the ultrasound acquisition system into a second localization of said region of interest within said referential of the X-ray acquisition system, using said localization of the ultrasound probe, and a generation and display device which

displays a bi-modal representation of said medical instrument in which said two-dimensional X-ray image and the three-dimensional ultrasound data included in said region of interest are combined using said second localization. An implementation of the present invention relates a two dimensional X-ray image to the coordinates of a three dimensional ultrasound image including a medical instrument and produces a bi-modal representation of the 2D X-ray image in the three dimensional ultrasound data with the medical instrument represented in the bi-modal representation.

Ben-Hiam et al. describes a system for measuring physiological signals inside the chambers of the heart with two catheters. One catheter is inserted with its tip at a reference location such as the apex of the heart. The other catheter is then manipulated to make the measurements. Each catheter has three sensors at its tip so that their coordinates can be sensed with a field generator. The position of the working catheter can then be known in relation to the coordinates of the reference catheter. At the very end of the description Ben-Hiam et al. say that the positions of the catheters in relation to the heart can be visualized with X-ray or ultrasound. How this is done is not explained. There is also no use of three dimensional ultrasound by Ben-Hiam et al. No bi-modal representations are made by Ben-Hiam et al.

Chia et al. describe a pair of catheters with ultrasound crystals at their tips which serve as beacons. This enables the tip of one catheter to do ranging with the other catheter. No imaging at all is done by Chia et al., only 3D ultrasound locating with the ranging system. No bi-modal representations are made by Chia et al., either.

Asahina et al. are doing x-ray fluoroscopy and ultrasound imaging. Asahina et al. are not using 3D ultrasound, as made clear by their references to "frame memories" for the 2D image frames.

Ultrasound images and fluoroscopy images are shown on separate displays, but time-matched so that concurrently acquired fluoroscopy and ultrasound images can be retrieved and shown at the same time. Asahina et al. are not forming bimodal images, either.

It is thus seen that this combination of three patents lacks at least three dimensional ultrasound data sets and bimodal images which combine a 2D X-ray image with a three dimensional ultrasound data set. A selector which selects a location around a medical instrument in 3D ultrasound data is also not found in any of these patents. It is therefore respectfully submitted that the combination of these three patents cannot render Claim 1 or its dependent Claims 2-13 unpatentable.

Claim 14 was rejected under 35 U.S.C. Sec. 103(a) as being unpatentable over Ben-Hiam et al. in view of Chia et al. in view of Asahina et al. in view of US Pat. pub. 2004/0254454 (Kockro). Claim 14 describes a method of guiding a medical instrument in a patient body, comprising the steps of acquiring a two-dimensional X-ray image of said medical instrument using an X-ray acquisition system, acquiring a three-dimensional ultrasound data set of said medical instrument using said ultrasound probe and an ultrasound acquisition system, localizing said ultrasound probe in a referential of said X-ray acquisition system, selecting a region of interest of said medical instrument within said 3D ultrasound data set, that define a first localization of said region of interest within a referential of said ultrasound acquisition system, converting said first localization within said referential of said ultrasound acquisition system into a second X-Ray localization within said referential of the X-ray acquisition system, and generating and displaying a bimodal representation of said medical instrument in which said two-dimensional X-ray image and the three-dimensional ultrasound data included in said region of interest are

combined using said second localization. The inventive method produces a bimodal representation of a 2D X-ray image in three dimensional ultrasound data with the medical instrument represented in its proper spatial location in the ultrasound data.

Kockro describes a system which produces a heads-up display in front of a surgeon in which the surgeon can visualize CT or MRI images of a surgical site such as the head. Using a probe 9, the surgeon can manipulate the data in space. Like the other three references, Kockro lacks any use of 3D ultrasound data and does not show or suggest bimodal representations of a 2D X-ray image in a 3D ultrasound dataset. The Examiner says that a "bounding box" constitutes selecting the region of interest of a medical instrument, but a reading of the cited passage says that the bounding box only delineates the surgical site, in this patent, surrounding the head. A surgical instrument could be anywhere in the head and is thus not spatially defined by the box. For all of these reasons it is respectfully submitted that Claim 14 is patentable over these four patents.

In view of the foregoing amendment and remarks, it is respectfully submitted that Claims 1-13 are clear and definite and that Claims 1-14 are patentable over any combination of Ben-Hiam et al., Chia et al., Asahina et al., and Kockro. Accordingly it is respectfully requested that the rejection of Claims 1-13 under 35 U.S.C. Sec. 112 and of Claims 1-14 under 35 U.S.C. Sec. 103(a) be withdrawn.

In light of the above it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration is respectfully requested.

Respectfully submitted,

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